

Remarks

This amendment responds to the Office Action dated March 24, 2003. A request for a three (3) month extension of time is enclosed herewith. Please charge Deposit Account Number 03-1231 for the \$465.00 fee.

A new Abstract is enclosed as requested by the Examiner.

With regard to the objections in paragraphs 2 and 3 of the Office Action, the following amendments to the description have been made to correct errors in the reference numerals stated therein and to conform the description with the drawings:

Original page 7 line 15: delete "122" and insert "22".

Original page 7 line 21: delete "26" and insert "26a,26b,26c,26d"

Original page 7 line 22: delete "128" and insert "28a,28b,28c,28d"

Original page 7 line 28: delete "26,28" and insert "26a,26b,26c,26d and 28a,28b,28c,28d".

Former page 9 line 22: delete "130" and insert "30".

The Examiner objected to the term "disc-like" used in claims 7, 14, 26, 29 and 30 as he considers this to render the claims indefinite. To overcome this objection, the word "disc-like" is replaced with the term "disc".

In view of the objections raised in paragraphs 6 and 7 of the Office Action, please amend Claims 11 and 22 as follows:

Claim 11:

A transducer element as claimed in Claim 9 in which said member is formed of a material,
said transducer element having a flux path linking said regions, [is] said flux path being closed
within the material of said member.

Claim 22:

A torque or force transducer element comprising:

A member adapted to transmit torque or force applied along, on or about an axis
extending through the member to a portion of the member spaced from said axis, or vice versa,

said member having a surface transverse to said axis,

a first, outer, region located between said axis and said portion and extending to said
surface;

a second, inner, region located between said axis and said outer region and extending
to said surface; [,] and

[said] first and second annular regions, being magnetised with opposite polarity, and
cooperating at said surface to generate a magnetic field component which is a function of said torque
or force.

No new matter is introduced in the application by the amendment to claims 11 and 22.

New Figure 13 has been added to this case. Support for this Figure may be found in Claim
4 and in the description on original page 12 line 28 to page 13 line 11. A reference to this Figure has
been introduced on page 13 and page 5 of the description. No new matter is introduced into the
application by new FIG. 13.

In the Office Action, on pages 3-6, paragraphs 8-12, the patent examiner rejects claims 1-30
as being non-patentable in view of certain prior art disclosed in the following references: U.S. Patent

No.6,145,387 to Garshelis; U.S. Patent No. 6,513,395 to Jones; and U.S. Patent No. 5,388,526 to Imai.

The Examiner cited Garshelis's, U.S. Patent No. 6,145,387, as being particularly relevant to the novelty of Claims 1 to 25 of the present application. His detailed reasoning is set out in paragraphs 9a to 9m of the Office Action.

The Garshelis '387 document appears to be directed to apparatus for measuring torque along a shaft (that is axially) rather than radially as alleged by the Examiner.

The main difference between the present invention and the Garshelis '387 document appears to lie in the fact that in the Garshelis document, the system is measuring torque in a shaft having two magnetised field sections which are adjacent to each other along the shaft and form circumferentially polarised regions of magnetisation in the shaft. By contrast, in the present invention, the apparatus is arranged such that torque is being measured in the disc structure so one magnetic field area is in the disc near the axis and the other magnetic field area is further out to measure the distortion in the disc.

With regard to claim 1 of the present application, the Garshelis '387 document does not disclose a transducer element comprising "a member having a structure which extends generally radially of an axis to transmit a stress between a radially inner region of the structure and a radially outer region," nor "at least one region of permanent magnetisation disposed between ... [the] inner and outer regions to be responsive to the transmitted stress and emanate a stress dependent magnetic field," these being features of Claim 1 of the present application. Thus, it is submitted that Claim 1 is novel over the Garshelis '387 document.

With regard to Claim 2, contrary to the Examiner assertions, the Garshelis '387 document does

It appear to disclose a transducer element having a radially inner magnetised region and a radially outer magnetised region between which a stress-dependent field is established, these being features of Claim 2 of the application. Accordingly, it is submitted that Claim 2 is novel over the Garshelis '387 document.

With regard to Claim 3, there does not appear to be any disclosure in the Garshelis '387 document of a transducer element in which the or each region of permanent magnetisation is arcuate with respect to the axis, as, in the system of Garshelis, the magnetisation extends all the way round the shaft and could not, therefore, properly be described as being arcuate. Accordingly, it is submitted that Claim 3 is novel over the Garshelis document.

With regard to Claim 4, there does not appear to be any disclosure in the Garshelis '387 document of the magnetisation being in the form of an interrupted annulus. The magnetisation is described as being in the form of a continuously extending annular ring, in the Garshelis '387 document. Accordingly, it is submitted that Claim 4 is novel over the Garshelis document.

With regard to Claims 5 and 12, these claims are both dependent upon Claim 1 and it is therefore submitted that these claims are novel over the Garshelis '387 document for the reasons set out above in support of Claim 1 of the present application.

With regard to Claim 6, the Garshelis '387 document does not appear to disclose a generally radially extending surface, this being a feature of Claim 6 of the present application. By contrast, the surface in the Garshelis '387 system is axial along the shaft. Accordingly, it is submitted that Claim 6 is novel over the Garshelis document.

With regard to Claims 7 and 18, the Garshelis '387 document does not appear to disclose a disc structure/shape in which torque is transmitted radially. By contrast, the system of Garshelis

'387 includes a shaft in which torque is transmitted **longitudinally** along the shaft. Accordingly, it is submitted that Claims 7 and 18 are novel over the Garshelis document.

With regard to Claim 8, the Garshelis '387 document does not appear to disclose regions being magnetised in an **axial direction** as is required by Claim 8. Accordingly, it is submitted that Claim 8 is novel over the Garshelis document.

With regard to Claims 9 and 11, the Garshelis '387 document does not appear to teach two radially extending surfaces in the form specified in Claim 9 and therefore cannot be said to disclose means located at one of said two surfaces to close a flux path between the two regions. Accordingly, it is submitted that Claim 9 and Claim 11 which is dependent on Claim 9 are novel over the Garshelis document.

With regard to Claim 10, the Garshelis '387 document does not appear to disclose **radially-spaced** magnetic poles of opposite polarity at a surface of the member, this being a feature of Claim 10. By contrast, the regions of permanent magnetisation in the Garshelis '387 document are shown and described as being **spaced side-by-side** along the shaft. Thus, Claim 10 is novel over the Garshelis document. *Fig. 3*

With regard to Claim 13 of the present application, it is submitted that the Garshelis '387 document does not disclose a single region of permanent magnetisation which extends obliquely to said axis, this being a feature of Claim 13. Figure 7 of the Garshelis '387 document merely shows the method of construction of the shaft containing a region of high permeability magnetic material sandwiched between regions of low permeability material. Figure 7 does not show any regions of permanent magnetisation extending **obliquely** to the axis of the shaft, the definition of "oblique" being at an angle which is not a right angle or a multiple of a right angle. Thus it is submitted that

Claim 13 is novel over the Garshelis document.

With regard to Claim 14 of the present application, contrary to the assertions of the Examiner, the Garshelis '387 document does not disclose nor teach a generally disc-shaped structure including a step portion in which the single region of permanent magnetisation is provided. The collar illustrated in Figure 8 of the Garshelis '387 document is not part of the shaft but rather is a cooling collar and is not a region of permanent magnetisation. Accordingly, it is submitted that Claim 14 is novel over the Garshelis document.

With regard to Claims 15 to 17, 22 and 23, the Garshelis '387 document does not appear to disclose, for the reasons mentioned above in connection with Claim 1, a transducer element having radially inner and outer regions of the type specified in these claims. Thus it is submitted that Claims 15 to 17, 22 and 23 are novel over the Garshelis document.

With regard to Claims 19, 20, 21, 23, 24, and 25, the Garshelis '387 system is not designed to produce a circumferential magnetic field but rather an axial field as the regions of permanent magnetisation in the shaft of the Garshelis system are side-by-side. Accordingly, the Garshelis system only detects the axial components of magnetic field and not radial or circumferential components as specified in Claims 19, 20, 21, 23, 24 and 25. Thus it is submitted that these claims are novel over the Garshelis document. (Col. 6 line 66 - Col. 7, line 7)

With regard to Claims 26 to 28, the Examiner stated that these claims to lack novelty over U.S. Patent No. 6,513,395 (Jones '395) for the reasons set out in paragraphs 10a to 10c of the Office Action.

It is submitted that the Jones '395 document does not disclose a transducer assembly in which

the "magnetised regions ... are at least arcuate or part annular," this being a feature of amended Claim 26 of the present application. Thus it is submitted that Claim 26 is novel over the Jones '395 document.

With regard to Claim 27, as this claim is dependent upon Claim 26, it is submitted that Claim 27 is also novel over the Jones '395 document for the reasons stated above in connection with Claim 26.

With regard to Claim 28 which is dependent upon Claim 26, it is submitted that the Jones '395 document does not disclose magnetised regions which are "**longitudinally magnetised with opposite polarities**," this being a feature of Claim 28. Thus it is submitted that Claim 28 is novel over the Jones '395 document.

With regard to Claims 29 and 30 of the present application, the Examiner has rejected these claims as being obvious over a combination of the teachings of Jones '395 and U.S. Patent No. 5,388,526 (Imai '526). Imai '526 appears to disclose a system in which the magnet (2) moves along a tube drawing outside magnet (m) along the outside of the tube. When the inner magnet reaches a bend in the tube, the discs in magnet 2 tilt on the shaft **radially**. This is in contrast to the present invention as defined by Claims 29 to 30 which requires the discs to flex or deform **axially**. Thus, it is our view that Imai '526 does not disclose flexing of a disc-shaped member in response to a relative displacement of the first and second members. Accordingly, it is submitted that a combination of the teachings of Jones '395 and Imai '526 would not obviously result in the structure claimed in Claims 29 and 30 of the present application as that structure is not disclosed nor taught in either Jones '395 or Imai '526.

Thus it is submitted that Claims 29 and 30 are inventive over Jones '395 and Imai '526.

The remaining two cited documents, U.S. Patent No. 6,389,910 (Eisenhower) and U.S. Patent No. 4,479,390 (Meixner) have been cited as of background interest only and have not been relied upon by the Examiner.

Applicant requests that the Examiner withdraw the section 102 and 103 rejections to claims 1 - 30 and allow those claims in the present case.

Respectfully submitted,

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